

Application Serial No. 10/659,653

Attorney Docket No. PF020108

**REMARKS**

Claims 1-9 are pending in this application with claims 1 and 6 being amended by this response.

**Rejection of Claims 1-5 under 35 USC § 102(e)**

Claims 1-5 are rejected under 35 USC § 102(b), as being anticipated by Kundu et al. (U.S. Patent No. 6,621,381 B1).

The present claimed invention recites a dielectric resonator antenna operating according to transverse electric (TE) mode comprising a single block of dielectric material of specific permittivity  $\epsilon_r$ . The block has a first face intended to be mounted on the earth plane and covered with a first metallic layer. At least one second face perpendicular to the first face is covered with a second metallic layer contacting the metallic layer covering the first face. The second metallic layer covers the second face extending over a width less than the width of the second face and over a height less than or equal to the height of the second face.

Kundu et al. (U.S. Patent No. 6,621,381 B1) describes a high frequency quarter wavelength dielectric resonator resonating in a transverse electric and magnetic (TEM) mode and provided with a rectangular dielectric block having an upper face, lower face, and 4 side faces. A first metallic layer is applied on the upper face, a second to the lower face and a third metallic layer is applied to one of the 4 side faces. The third metallic layer applied to one of the 4 side faces corresponds to an excitation electrode. Additionally the resonator includes two silver layers, the interior of which is filled with dielectric material.

The Examiner contends that Kundu et al. disclose a dielectric resonator comprising a block of dielectric material of specific permittivity of  $\epsilon_r$  with the block having a first face intended to be mounted on an earth plane and covered with a first

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metallic layer, and at least a second face perpendicular to the first face is covered with a second metallic layer contacting the first layer, the second layer covering the second face extending over a width less than the width of the second face and over a height less than or equal to the height of the second face. Kundu et al. utilizes a transverse electric and magnetic (TEM) mode  $\lambda/4$  dielectric resonator. The present claimed invention, however, discloses a dielectric resonator antenna operating according to transverse electric (TE) mode. Pages 1264-1265 of the November 10, 2005 issue of *Electronic Letters* (Vol. 41, No. 23) describes the difference between TEM and TE modes, copy attached. TEM resonant frequency depends on the dielectric resonator's height and not on its other dimensions. TE and TM modes, however, have higher resonant frequencies if width and length are correctly chosen. Thus, TE and TM mode frequencies are dependent on the width and length of the dielectric resonator. The motivation for operating according to TE mode, more specifically in  $TE_{111}$  mode, is to obtain a very compact antenna, which is the inventive feature of the present claimed invention. Thus, Kundu et al. neither disclose nor suggest "Dielectric resonator antenna operating according to transverse electric (TE) mode comprising a single block of dielectric material of specific permittivity  $\epsilon_r$ ", as in the present claimed invention.

In view of the above remarks, it is respectfully submitted that there is no 35 USC 112 enabling disclosure contained within Kundu et al. that anticipates the present invention as claimed in independent claim 1. Therefore, it is further respectfully submitted that this rejection has been satisfied and should be withdrawn.

As claims 2-5 are dependent on claim 1, it is respectfully submitted that claims 2-5 are not anticipated by Kundu et al. for the same reasons as claim 1. In view of the above remarks and amendments to the claims, it is thus further respectfully submitted that this rejection is satisfied and should be withdrawn.

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Rejection of Claims 6-9 under 35 USC § 103(a)

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Claims 6-9 are rejected under 35 USC § 103(a), as being unpatentable over Kundu et al. (U.S. Patent No. 6,621,381 B1) in view of Adachi et al. (U.S. Patent No. 6,198,450 B1).

Adachi et al. (U.S. Patent No. 6,198,450 B1) describes a hemispherical dielectric resonator arranged on a metal substrate to make a flat surface of the hemispherical dielectric resonator contact with the metal substrate, and a dielectric wave-guiding channel connected with a curve side surface of the hemispherical dielectric resonator to form a dielectric resonance antenna. A signal transmitted through the dielectric wave-guiding channel is fed in the hemispherical dielectric resonator, the hemispherical dielectric resonator is resonated, and an electromagnetic wave is radiated. The dielectric resonance antenna functions as a wave radiation device.

While Adachi et al. describes a slot provided in a substrate and a microstrip line provided on the substrate opposite to the face forming ground plane crossing the slot, the wave-guiding channel in Adachi et al. is fed from a curved side surface portion of the hemispherical dielectric resonator. Thus, Adachi et al. neither disclose nor suggest a “Dielectric resonator antenna operating according to transverse electric (TE) mode comprising a single block of dielectric material of specific permittivity  $\epsilon_r$ ”, as recited in claim 1 of the present claimed invention.

Furthermore, there is no motivation or reason to combine the systems of Kundu et al. and Adachi et al. to produce the present claimed invention as the two systems are incompatible. The system of Kundu et al. is a dielectric resonator that includes a rectangular dielectric block having top and bottom planar surfaces, and four side surfaces. The system of Adachi et al., on the other hand, is a hemispherical dielectric resonator. In order to produce the present claimed invention, one would be required to take individual aspects of each invention. This is contrary to the provisions of 35 USC § 103(a) in which each reference must be considered in its entirety and it is not permissible to pick and choose features of a reference for combination with other

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 references. As set forth in *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1051, 5  
 USPQ2d 1434, 1438 (Fed.Cir. 1988), *cert. denied*, 488 U.S. 825 (1988); *Ashland Oil*  
*Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 28, 293, 227 USPQ 657, 664  
 (Fed.Cir. 1985), *cert. denied*, 475 U.S. 1017 (1986); *ACS Hosp. Sys., Inc. v. Montefiore*  
*Hosp.*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed.Cir. 1984), the reason why one  
 having ordinary skill in the pertinent art would have been led to modify the prior art or  
 to combine prior art references to arrive at the claimed invention must stem from some  
 teaching, suggestion, or implication in the prior art as a whole or knowledge generally  
 available to one having ordinary skill in the art.. Additionally, the inventive aspects of  
 each of Kundu et al. and Adachi et al. are directly related to the shape of both dielectric  
 resonators. Thus, the combination of these references would not produce an operable  
 system. Each of these systems is designed to solve unrelated problems in unrelated  
 manners. The invention disclosed in Kundu et al. provides a TEM-mode dielectric  
 resonator and bandpass filter using the resonator while the invention disclosed in  
 Adachi et al. provides dielectric resonator antenna for mobile communication.

However, even if one were to combine these references, the combined system  
 would include a rectangular dielectric block having top and bottom planar surfaces, and  
 four side surfaces, as well as a hemispherical dome. The system would not provide a  
 dielectric resonator antenna comprising a single block of dielectric material operating  
 according to TE mode, as in the present claimed invention. Therefore, the combined  
 system, similarly to the individual references, neither discloses nor suggests a  
 "Dielectric resonator antenna operating according to transverse electric (TE) mode  
comprising a single block of dielectric material of specific permittivity  $\epsilon_r$ " as claimed  
 in claim 1 of the present invention.

In view of the above remarks, it is respectfully submitted that there is no 35 USC  
 112 enabling disclosure contained within Kundu et al. and Adachi et al., when taken  
 alone or in combination, that makes the present invention as claimed in independent  
 claim 6 unpatentable. Therefore, it is further respectfully submitted that this rejection  
 has been satisfied and should be withdrawn.

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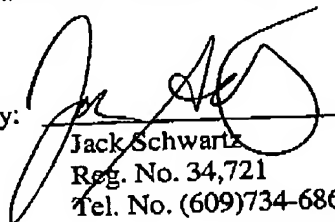
As claims 7-9 are dependent on claim 6, it is respectfully submitted that claims 7-9 are inventive over Kundu et al. in view of Adachi et al. for the same reasons as claim 6. It is thus further respectfully submitted that this rejection is satisfied and should be withdrawn.

Having fully addressed the Examiner's rejections, it is believed that, in view of the preceding amendments and remarks, this application stands in condition for allowance. Accordingly then, reconsideration and allowance are respectfully solicited. If, however, the Examiner is of the opinion that such action cannot be taken, the Examiner is invited to contact the applicant's attorney at the phone number below, so that a mutually convenient date and time for a telephonic interview may be scheduled.

No fee is believed due. However, if a fee is due, please charge the fee to Deposit Account 07-0832.

Respectfully submitted,  
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